

FASTENER CLOSURE ARRANGEMENT FOR FLEXIBLE PACKAGES

CROSS-REFERENCE TO RELATED APPLICATIONS

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United States patent application Serial No. 09/837,694,  
5 filed April 18, 2001 (Attorney Docket No. 67286).

*, now United States Patent No. 6,616,333*

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention pertains to the closure  
of flexible packages, such as plastic bags, and in  
10 particular to fastener closures employing sliders.

2. Description Of The Related Art

With the recent emphasis in providing consumers  
with bulk quantities of various commodities, such as food  
products, reclosable packages have become increasingly  
15 popular. One of the most popular means of providing  
reclosability is to employ zippers of various types,  
particularly zippers which are compatible with flexible  
packages of plastic film construction. Manufacturers of  
food products and other commodities are concerned with  
20 filling the contents of a flexible package as quickly and  
economically as possible. It is important that the  
opening provided by the fastener be made as large as  
practically possible. Consumers or other end users also  
prefer large sized openings for easy extraction of  
25 products from the package interior. Even with large  
openings, however, products within the package may  
interfere with fastener operation when the product is  
poured or otherwise dispensed from the package becomes  
entrained in the fastener components.

30 Other improvements to flexible reclosable  
packages are being sought. For example, when handling  
products comprised of numerous small pieces, such as  
shredded cheese or cereal, for example, it is generally  
desirable to have the package formed into a pouch which  
35 is open at one end, or along one side, so as to allow the

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product to be poured or shaken through the reclosable opening. It is desirable that the product be allowed to freely flow past the reclosable opening. Preferably, the path taken by the product within the package should be  
5 made as smooth as possible.

Although improvements have been made in the art of plastic welding and joining, manufacturers of consumer products employing high speed production techniques are continually seeking improved package forming methods and  
10 equipment. Concern has been focused on the formation of stop members which limit the travel of a sliding closure traveling along fastener tracks. Any reduction in the time needed to form these and other package features can result in substantial cost savings.

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#### SUMMARY OF THE INVENTION

It is an object of the present invention to provide a shrouded flexible package with an improved fastener closure.

Another object of the present invention is to  
20 provide reclosable packages having fastener sliders which are protected during shipment and display, and afterwards, when the package contents are poured out or otherwise extracted.

A further object of the present invention is to  
25 provide a shrouded reclosable package having improved arrangements for hanging display.

Yet another object of the present invention is to provide a shrouded reclosable plastic package having a slider fastener with improved containment of the slider  
30 in a manner which also optimizes the size of the bag opening.

A further object of the present invention is to provide a shrouded plastic bag having a slider fastener with an improved end or "crush" seal of the fastener  
35 tracks.

These and other objects of the present invention are attained in a reclosable flexible package

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comprising opposed front and rear panels that have sides joined together to form an interior and a package opening communicating with said interior. The reclosable flexible package has first and second interlockable 5 fastener tracks configurable in an interlocked, closed position and an unlocked open position. It has a slider movable along fastener tracks to configure tracks in interlocked position to close opening and to configure fastener tracks in unlocked position so as to allow 10 access through opening to package interior. The fastener tracks have opposed ends located adjacent, opposed sides of front and rear panels. The stops adjacent ends of fastener tracks interfere with and prevent travel of slider beyond fastener tracks. A side seal of pre- 15 selected width joins together one side of front and rear panels. A shroud covers slider and at least the major portion of fastener tracks. Weakening portions extend adjacent fastener tracks and sever the remainder of reclosable flexible package.

20 It has been determined that, in a practical commercial environment, it is difficult to employ conduction heat sealing techniques to form the slider stop. It is preferred that the stop be formed using ultrasonic sealing techniques, as these afford greater 25 control over dimension and shape. This is important when the maximum number of advantages accorded the present invention are being sought, since the mass, and particularly the frontal surface area of the stop is reduced to the greatest extent possible.

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BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary front elevational view of a flexible package according to principles of the present invention;

35 FIG. 2 is a fragmentary cross-sectional view taken along the line 2-2 of FIG. 1;

FIG. 3 is a fragmentary end view indicated by line 3-3 of FIG. 1;

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FIG. 4 is fragmentary front elevational view showing construction of the flexible package;

FIG. 5 is a top plan view of the slider member;

FIG. 6 is a front elevational view thereof;

5 FIG. 7 is an elevational view from one end thereof;

FIG. 8 is an elevational view from the other end thereof;

10 FIG. 9 is an end view of a fastener track sub-assembly;

FIG. 10 is a cross-sectional view, in schematic form, taken along the line 10-10 of FIG. 1 with the slider moved to the left;

15 FIG. 10a is a fragmentary view, of FIG. 10 shown on an enlarged scale;

FIGS. 10b and 10c show alternative seal constructions;

FIG. 11 is a fragmentary front elevational view showing contents being poured from the flexible package;

20 FIG. 12 is a fragmentary front elevational view showing contents of a prior art package;

FIG. 13 is a fragmentary front elevational view showing a flexible package according to principles of the present invention;

25 FIG. 14 is a front elevational view of an alternative embodiment of a flexible package according to principles of the present invention;

FIG. 15 is a fragmentary elevational view of a shrouded flexible package according to principles of the 30 present invention;

FIG. 16 is a fragmentary cross-sectional view taken along line 16-16 of FIG. 15;

FIG. 17 is a fragmentary end view of the package of FIG. 15;

35 FIG. 18 is a fragmentary elevational view of a further embodiment of a flexible package according to principles of the present invention;

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FIG. 19 is a fragmentary elevational view of another embodiment of a shrouded flexible package;

FIG. 20 is a cross-sectional view taken along the line 20-20 of FIG. 15;

5 FIG. 21 is a cross-sectional view similar to that of FIG. 20, shown with the schematic depiction of tooling to form the flexible package;

FIG. 22 is a fragmentary elevational view of a further embodiment of a shrouded flexible package;

10 FIG. 23 is a fragmentary elevational view of an additional embodiment of a shrouded flexible package;

FIG. 24 is a cross-sectional view similar to that of FIG. 20 but showing an alternative shroud construction;

15 FIG. 25 is a fragmentary elevational view of a further embodiment of a shrouded flexible package;

FIG. 26 is a fragmentary view of FIG. 25, shown on an enlarged scale; and

20 FIG. 27 shows the flexible package being partially opened.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings and initially to FIGS. 1-8, a flexible package illustrating principles of the present invention is generally indicated at 10.

25 Flexible package 10 preferably comprises a plastic bag having front and back panels 12, 14 joined together at the left end by a side seal 20 and at the right end by a side seal 22. Side seal 20 is preferably of conventional conduction heat-sealed construction, having a generally 30 constant width throughout. Panels 12, 14 are further joined together at their bottom ends by a bottom seal 24 (see FIG. 10) extending between side seals 20, 22, as is known in the art. Alternatively, the bottom seal can be replaced by a fold line with panels 12, 14 being formed 35 from a continuous sheet of plastic material.

The upper end of flexible package 10 features a reclosable opening including a slide fastener

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arrangement with fastener tracks 26, 28 and a slider 30, all preferably of polyolefin material. The slider 30 is slidable along the fastener tracks, causing the fastener tracks to interlock or mate (as shown in FIG. 2) for 5 closure of the flexible package and to unmate or separate to open the flexible package for access to contents in the package interior. As will be seen herein, features associated with the fastener slider arrangement allow an unprecedented enlarged opening of the flexible package.

10 The enlarged package opening made possible by the present invention benefits manufacturers filling the package, as well as consumers dispensing product from the interior of the flexible package. In the preferred embodiment shown, the fastener tracks are also referred to as "zipper" 15 tracks.

The flexible package according to principles of the present invention has found immediate commercial acceptance for use with food products, including perishable food products, such as cheese. Accordingly, 20 it is generally preferred that the flexible package includes a hermetic seal 36 in the form of a peelable seal as taught in commonly assigned United States Patent Nos. 5,014,856; 5,107,658 and 5,050,736, the disclosures of which are incorporated by reference as if fully set 25 forth herein.

As mentioned above, flexible package 10 preferably comprises a bag having panels 12,14 formed from plastic sheet material. The sheet material can be of a single material type, such as polyolefin materials 30 including polyethylene and polypropylene, but preferably comprises a laminate assembly of several different material types, as is known in the art to provide a barrier to moisture as well as certain gases, such as oxygen or inert fillers of the types used with food 35 products. Other types of laminate films, such as those known in the art to preserve food freshness, may be employed. Where the contents of the flexible package are not perishable or where other considerations may dictate,

the panels 12, 14 can be constructed without regard to gas or vapor barrier properties. FIGS. 2 and 3 indicate that it is generally preferred that the fastener tracks be joined to web-like flanges which, in turn, are joined to panels 12, 14 as will be described below with reference to FIG. 10.

Referring now to FIGS. 5-8, fastener slider 30 has a top wall 44, a shorter side wall 46 and a longer side wall 48, cooperating to define an internal cavity 50 for receiving the fastener tracks 26, 28. As can be seen by comparing the end views of FIGS. 7 and 8, a first end 54 of the slider defines a cavity which is generally rectangular. The opposed end 56 (shown in FIG. 8) defines a cavity which is generally arrowhead or A-shaped, as indicated by reference numeral 50b, conforming to the outline of the interlocked fastener tracks shown in FIG. 2. When the slider 30 of FIG. 1 is moved to the right, end 56 is at the leading end of the slider and the fastener tracks 26, 28 are unlocked, thus opening the flexible package 10. Conversely, as slider 30 of FIG. 1 is moved to the left, end 54 (shown in FIG. 7) is made the leading end, and fastener tracks 26, 28 are interlocked in the manner indicated in FIG. 2, to close the flexible package.

25 Referring again to FIGS. 2, 7 and 8, a number  
of features cooperate to maintain slider 30 captive on  
fastener tracks 26, 28. As can be seen for example in  
FIG. 8, a pair of upwardly facing stepped portions 62 are  
formed on either side of the slider cavity. Inwardly  
30 extending protrusions 64 are located at the other end of  
the slider. Protrusions 64 and stepped portions 62  
engage the bottoms 26a and 28a (see FIG. 2) of fastener  
tracks 26, 28, as can be seen for example in FIG. 10.  
The engagement of the stepped portions 62 and the  
35 protrusions 64 with the bottoms of the fastener tracks  
prevents the slider from being upwardly dislocated from  
the fastener tracks.

Referring to FIGS. 1, 3 and 13, the ends of the of the fastener tracks are deformed or "crushed" to form stops 68. Preferably, stops 68 are formed by the application of ultrasonically generated heat and pressure 5 to the ends of fastener tracks 26, 28. It has been found that the use of present day conduction heat sealing techniques does not provide the control needed to attain the intricate, close tolerance design of stop members according to principles of the present invention.

10 Further, it has been found that the use of present day conduction heat sealing techniques immediately adjacent previously formed stop members tends to distort the stop members, oftentimes to an extent rendering the stop members unacceptable from a quality control standpoint.

15 As will be seen herein, stops 68 are configured for maximum efficiency, having the smallest front elevational surface area (i.e., the surface area visible in FIGS. 1 and 13, for example) which is adequate for containing slider 30 on the fastener tracks.

20 Referring to FIG. 3, the sides of the fastener tracks are softened and compressed at stop faces or sides 72 so as to impart a pre-selected width w and an upwelling displacement u above the upper surfaces 26b, 28b of fastener tracks 26, 28 (see FIG. 2). The material 25 displaced above the upper surface of the fastener tracks interferes with the top wall 44 and ends of slider 30 to limit its sideways travel.

With reference to FIG. 3, the slider stop 68 (that is, the deformed portion of fastener tracks 26, 28) 30 is carefully configured so as to avoid deformation of the bottom surfaces 26a, 28a of the fastener tracks. With reference to FIG. 1, the lower ends of the fastener tracks extend undeformed, substantially to the side edges 16, 18 of the flexible package 10. FIG. 1 shows slider 35 30 "parked" at a fully opened position, with end 56 contacting the stop 68 located at the right hand end 22 of the flexible package. Stop members 68 and the undisturbed bottom surfaces 26a, 28a of the fastener

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tracks in the area of stop members 68 cooperate to captivate slider 30 on the fastener tracks, preventing its unintentional removal from flexible package 10.

It is preferred that the bottom edges 26a, 28a 5 remain undeformed also for that portion extending beyond slider 30, and underneath at least a portion of the right hand stop 68. With reference to FIG. 3, a gap  $g$  is formed between the bottom edges of the fastener tracks and the top portion 81 of side seal 22. As can be clearly seen 10 in FIG. 3, the stop 68, formed by ultrasonic techniques, is separated by a substantial distance from the side seal, which is typically formed using conduction heat seal techniques found to be incompatible with the precise, high resolution ultrasonic techniques used to 15 form stop 68. A second stop 68 formed at the left hand end 16 of flexible package 19 is constructed in a similar fashion and extends beyond the end 54 of slider 30 when the slider is moved fully to the left, closing the upper end of the flexible package. As will be explained in 20 greater detail herein, separation of the "crush" operation performed on the fastener tracks to form stops 68 from the conduction heat sealing operation to form the enlarged side seals, allow stops 68 to take on a reduced size, effectively extending the size of the package 25 opening, without sacrificing ability of the stops to effectively retain slider 30 on the fastener tracks.

Referring to FIGS. 1 and 4, side seal 22 includes an upper enlarged or tapered portion 80 having a width substantially greater than the lower end of side 30 seal 22, sufficient to underlie the substantial entirety of slider 30 when the slider is fully moved to the "parked" position as shown in FIG. 1. The width of the enlarged, tapered portion 80 ranges between 200% and 400% (or more for very narrow side seals, e.g., 2 mm or less) 35 of the width  $s$  of side seal 22 and most preferably ranges between 250% and 300% of the side seal width  $s$ .

The enlarged, tapered end 80 of side seal 22 has a S-shaped or double re-entrant bend contour 84 which

partly defines the package interior. With reference to FIG. 11, the curved edge 84 of the enlarged side seal portion 80 provides a smooth transition at the corner of the package opening, preventing product entrapment within 5 the flexible package. As those skilled in the art will appreciate, the smooth transition at the opening corner is especially beneficial for flexible packages, where shaking techniques otherwise suitable for rigid packages, are rendered largely ineffective by flexible panels 12, 10 14 and especially panels of very thin, unsupported material which are likely to collapse in use.

The smooth transition provided by curved edge 84 also deflects or guides product 86 away from slider 30 as product is poured or otherwise removed from flexible 15 package 10. This prevents contamination of mating surfaces of the slider and the fastener tracks, which would otherwise deteriorate the ability of slider 30 to move freely, performing interlocking and unlocking of the fastener tracks. As indicated in FIG. 12, in prior art 20 arrangements product 86 is allowed to freely contact the bottom end of slider 30, a condition which is avoided by flexible packages according to principles of the present invention.

Preferably, fastener tracks 26, 28 are 25 "crushed" to form stop member 68, using conventional ultrasonic heating equipment which allows for a highly accurate shaping of the stop member as well as withdrawal of the deformation area away from the bottom surfaces 26a, 28a as shown, for example, in FIG. 3. As can be 30 seen for example in FIG. 1, the width of stop member 68 is considerably less than the enlarged tapered portion 80 of side seal 22, and preferably is of a smaller width than that of the narrower major portion of side seal 22. With reference to FIG. 1, the width d of stop member 68 35 is less than the width s of side seal 22. Preferably, stop member width d ranges between 50% and 200% of the width s of side seal 22. Preferably, the width w of the stop member 68 (i.e., the "crush" dimension) ranges

between 25% and 80% of the width z of the fastener tracks, as illustrated in FIG. 3. The amount of upward displacement or upwelling u is approximately at least as great as the thickness of upper wall 44. It should be  
5 kept in mind that the total mass of the stop must be sufficient to hold the slider captive.

The stop member 68, in addition to having a reduced width d in front elevational view and a small width w in end view (see FIG. 3), has a sufficiently smaller mass and frontal surface area than stops employed in the prior art. This construction allows the slider 30 to be moved to an extreme position immediately adjacent the edge 22 of flexible package 10, thus maximizing the package opening, allowing for easier removal of the package contents. This reduced size of stop 68 also contributes to the precision of the ultrasonic heating and formation of the stop member, needed to attain required precise dimensions. Further, from a manufacturing standpoint, the dwell time to melt and shape the stop 68 is substantially reduced, contributing to the overall efficiency for the package manufacturer.

In contrast to the present invention, prior art stop members have been formed by "crushing" the entire fastener profile, including the bottom surfaces 26a, 28a.

25 In addition, even if ultrasonic techniques are employed for the stop member, prior art side seals (formed using conduction heat seal techniques and much larger, oftentimes three to four times larger than side seals according to the present invention) were typically

30 overlaid with the stop, contributing to a substantial distortion of the stop structure. Even if the prior art side seals were made to stop short of the fastener tracks, the relatively high-level of conduction heating in the immediate proximity of the stop have been found to

35 cause a distortion of the stop, degrading control over its size and shape. These disadvantages are avoided with practice of the present invention, where the small, compact size of the stop is employed, and the gap  $q$  is

formed between undeformed fastener bottom surfaces 26a, 28a and the enlarged seal portion 80.

Turning now to FIGS. 4, 9 and 10, and initially to FIG. 9, the fastener tracks are preferably formed from 5 a sub-assembly generally indicated at 70 in which the fastener tracks 26, 28 are provided with corresponding fastener flanges 72, 74. The fastener flanges 72, 74 are co-extensive with the fastener tracks 26, 28 and take the form of a plastic web to be heat sealed to the panels 12, 10 14. As can be seen in FIG. 9, fastener flange 74 is shorter in height than fastener flange 72, so as to accommodate the preferred hermetic seal arrangement shown in FIG. 10. The fastener flanges 72, 74 are heat sealed to panels 12, 14. With reference to FIGS. 4 and 10, 15 fastener flange 72 is welded or otherwise mechanically sealed to panel 12 at weld band 78. As shown at the upper portion of FIG. 10, the upper ends of panels 12, 14 are joined to the outer outwardly facing surfaces of fastener flanges 72, 74 at points intermediate the 20 fastener tracks and peelable seal 36. Band 36 preferably comprises a hermetic peelable seal formed by the joinder of panel 14 to the inside face 72a of fastener flange 72 (see FIGS. 10 and 10a). Panel 12 is sealed to the opposite outside face of the fastener flange as 25 schematically indicated in FIG. 10. In FIG. 10a the components of the peelable seal 36 are shown, with film 12, which plays no part in the preferred peelable seal, being shown in phantom. Variations of the peelable seal are also contemplated by the present invention. For 30 example, in FIG. 10b, the flanges 72, 74 of the fastener arrangement are joined with a peelable seal. The upper ends of these flanges are heat sealed to panels 12, 14 as shown. In FIG. 10c a further alternative is shown with the peelable seal 36 being formed at the joinder of lower 35 portions of panels 12, 14. the upper portions of panels 12, 14 are heat sealed to fastener flanges 72, 74.

As will now be appreciated, the enlarged, tapered end portions 80 of side seal 22 cooperate with

other features of flexible package 10 to provide a number of important advantages. More specifically, the enlarged tapered end portions 80 provide a smooth transition of the interior of flexible package 10 preventing product 5 entrapment in the slider and fastener track surfaces when the product is poured or otherwise dispensed. In addition, the enlarged tapered portion 80 helps to secure slider 30 about tracks 26, 28 by maintaining a clearance from bottom surfaces 26a, 28a of the fastener tracks. 10 Further, the enlarged tapered portions 80 of side seals 22 strengthen and rigidify edge portions of panels 12, 14 in the immediate area of the parked position of slide 30.

Often, the greatest amount of force applied by the user to slider 30 occurs at the closing of the 15 slider, when the fastener tracks are unlocked or separated from one another. When the slider 30 is in the middle of its travel along the fastener tracks, the user is provided with a sensation of the proper direction of slider movement. However, when the slider 30 is in the 20 parked position, and especially in the "parked open" position shown in FIG. 1, the user's initial application of force may be misdirected. The enlarged tapered portion 80 provides added stiffness and rigidity to the flexible package at the initial point where pressure is 25 applied to the slider, thus further contributing to the assurance that secure engagement will be maintained between slider 30 and the tracks 26, 28.

With reference to FIG. 4, a consumer desiring to close the flexible package will grasp the enlarged 30 side seal portion 80, pulling in the direction of arrow 81 while pulling or pushing slider 30 in the direction of arrow 31. The added stiffness and rigidity offered by enlarged side seal portion 80 is provided at a point of optimal effectiveness to react in an appropriate manner 35 to forces applied to slider 30 and to overcome any resistance of the tracks 24, 26 to resume a mating, interlocked condition as the fastener tracks are interlocked. Those skilled in the art will appreciate

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that the "rolling resistance" or dynamic resistance to movement of slider 30 is oftentimes lower than the initial static resistance, opposing movement of the slider away from the fully opened parked position shown,  
5 for example, in FIG. 4.

The added stiffness and rigidity imparted to the flexible package 10 and especially panels 12, 14 by enlarged side seal portion 80 results in other advantages when lightweight panels 12, 14 are employed. For  
10 example, panels of the single polyolefin type where no laminate film (such as PET or NYLON) is used to stiffen and support the support panel, have oftentimes excluded the use of sliding zippers, since minimum stiffness and  
15 rigidity needed to operate a fastener slider was not available. However, with enlarged side seal portions according to principles of the present invention, adequate stiffness is provided, even for lightweight, so-called "single" films.

As indicated in FIG. 10, flanges 72, 74 are joined to respective panels 12, 14, preferably at their lower ends, so as to prevent product from entering between flange 72 and panel 12, as well as between flange 74 and panel 14. In certain applications this may not be a critical requirement. In FIG. 10, the upper portion of  
25 panel 12 is shown for illustrative purposes as spaced from the lower end of flange 72. In practice, it is generally preferred that this spacing be eliminated, with panel 12 being in intimate contact with flange 72. Similarly, any gap between panel 14 and the lower end of  
30 fastener flange 74 is preferably eliminated. Although it is most preferred that the peelable seal be formed by joining panel 14 to fastener flange 72, the peelable seal, preferably a hermetic seal, can be formed between the fastener flanges 72, 74 or directly between the  
35 panels 12, 14, although these alternative constructions are less preferred than the arrangement shown in FIG. 10.

Turning now to FIG. 13, flexible package 10 is shown constructed with the panels 12, 14, side seal 22,

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upper enlarged side seal portion 80 and fastener tracks 26, 28, as described above. The fastener tracks 26, 28 are preferably joined to flanges 72, 74 (not visible in FIG. 13). FIG. 13 schematically illustrates commercial 5 fabrication of flexible package 10. As will be appreciated by those skilled in the art, practical commercial assembly requires recognition of tolerances of the equipment and materials used to construct a viable commercial product. For example, tracks 26, 28 are 10 ultimately mechanically coupled to panels 12, 14 using conduction heat seal tooling. A gap 110 shown in FIG. 13 represents the tolerance range or margin of error for tool alignment used to secure the fastener tracks 26, 28. As mentioned, it is preferred that the upper end of 15 enlarged side seal portion 80 be spaced below the lower ends of the fastener tracks, such as the lower end 26a of fastener track 26, visible in FIG. 13. Further, it is preferred that the gap 110 continue beyond the end 56 of slider 30. 20 A gap 116 represents a tolerance range or margin of error for the desired positioning of the upper end of enlarged side seal portion 80, to provide clearance for the bottom edge of slider 30. As illustrated in FIG. 13, the upper end of enlarged side 25 seal portion 80 falls at an outermost limit of its tolerance range. Preferably, the upper end of enlarged side seal portion 80 is within the gap 116, rather than to one end thereof. The gap 116 also accounts for any cant or angular mis-positioning or mis-alignment where 30 the upper end of side seal 80 may be angled slightly from a position parallel to the fastener tracks, as may be encountered in a practical commercial environment.

A band 120 shown in FIG. 13 represents a conduction heat seal of the fastener flange to the panels 35 12 or 14. This conduction heat seal 120 provides the principal mechanical attachment of the fastener track assembly to the package panels. Band 36 is the peelable seal, preferably a hermetic seal, between panel 14 and

fastener flange 72. A gap 124 represents the desired production spacing between production seal 120 and peelable seal 36. The remaining band 128 represents the production tolerance range or margin of error for 5 positioning of peelable seal 36 with respect to the package panels.

In one commercial embodiment, flexible package 10 comprises a plastic bag having a width of approximately 6.5 inches from side edge to side edge and a total 10 overall height of approximately 10.75 inches. The fastener tracks 26,28 have a height of approximately 4 millimeters, with gaps 110, 116 each having a height of 2 millimeters. As shown in the upper right hand corner of FIG. 13, stop 68 projects a distance u above the top edge 15 of the fastener tracks. In FIG. 13, only the top edge 26b is visible. With reference to FIG. 10, the upper ends of panels 12, 14 are preferably spaced a distance p from the bottom edges of the fastener tracks, ranging between 2 and 3 millimeters. The conduction heat seal 20 120 and the peelable seal 36 each have a height of 6 millimeters, and gap 124 located between the two, has a height of 2 millimeters. The desired spacing between conduction heat seal 120 and peelable seal 36 has a maximum value of 2 millimeters and a minimum value 25 required to prevent overlap of the conduction heat seal and peelable seal. The side seal 22 has a width ranging between 3 and 8 millimeters and the stop 68 has a width (see reference character d in FIG. 1) ranging between 8.0 and 13.0 mm. As can be seen with reference to FIG. 13, 30 the upper end of side seal 22 is spaced a substantial distance below the upper edge of the flexible package. This spacing ranges between a minimum value equal to the combined height of the fastener tracks and gap 110, and a maximum value equal to the combined height of the 35 fastener tracks, gap 110 and gap 116.

Referring to FIG. 14, several alternative features are shown with reference to a flexible package 130. The right hand portion of flexible package 130 is

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identical to flexible package 10, described above, except for the addition of a peg hole 132 formed in the enlarged side seal portion 80. Flexible package 130 has a left side seal 20 as described above with respect to FIG. 1.

5 However, in the flexible package 130, the upper end of side seal 20 is enlarged at 138 in a manner similar to that of enlarged side seal portion 80. An optional peg hole 140 is formed in the enlarged side seal portion 138. Although the peg holes 132, 140 are shown having a

10 circular shape, virtually any shape (e.g., oval) can be used, as well. Peg holes 132, 140 can be formed by punching before or after the side seals are fully formed, it being preferred that the upper ends of the side seals provide a complete sealing of the panels and other

15 components of the flexible package. It will be appreciated by those skilled in the art that the holes add heat relief to the enlarged side seal portion. This helps preserve the uniformity of the tapered area and of the dimensioning of gap  $g$ , as well as the uniformity of

20 shrinkage which helps control manufacture on a production basis. If desired, the heat sealing die can be made hollow in the region of the peg holes, even in the absence of peg hole features to attain further heat relief advantages. It may also be preferable in some

25 instances to form the peg holes 132, 140 as part of the formation of the side seals using, in effect, a thermal cutting or thermal punching technique. With the inclusion of two peg holes 132, 140, flexible package 130 can provide an improved presentation of art work or other

30 indicia carried on the panels of the flexible package.

It is generally preferred that textual and graphic information be oriented, generally perpendicular to the side edges of the flexible package. If only one peg hole is provided, the package will tend to hang

35 rotated in a vertical plane, according to the distribution of product within the flexible package. With support given to two peg holes 132, 140, the flexible package is oriented in an upright position,

making it easier to read the text and graphical information carried on the package. If desired, the text and graphical information printed on the rear panel can be inverted so that a consumer can "flip" the package to 5 inspect the rear panel, without having to remove the package from the support pegs passing through peg holds 132, 140.

Although the package opening, fastener tracks and related features are shown at the upper end of the 10 flexible package, the present invention is intended to cover arrangements in which the opening and related structure is provided on the side or bottom of the flexible package.

Referring now to FIGS. 15 and following and 15 initially to FIG. 25, an improved package according to principles of the present invention, is shown. Package 200 includes the features of flexible package 10, described above and in addition includes a shroud portion 204 extending above line of weakness 208 formed in panels 20 12, 14. Line of weakness 208 can be formed using available conventional techniques, and is preferably formed using laser cutting/scoring techniques. Preferably, line of weakness 208 extends across the width 25 of flexible package 200, from one side edge to the other. As shown line of weakness 208 extends between side seals 20, 22.

Preferably, shroud 204 is made for easy tear-away removal in an intuitive manual operation not requiring special directions. Preferably, a tear-start 30 feature 210 is formed in edge 18, and is located slightly above stop 68. The tear-start feature 210 preferably takes the form of a slit, but could also comprise a tear-start feature or other weakening feature, if desired. In the preferred embodiment, as illustrated, the tear-start 35 feature 210 comprises a linear slit extending toward an opening 214 which surrounds slider 30. In the preferred embodiment, the slit line comprising tear-start feature 210 spaced from opening 214 and is terminated within a

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thin seal 220. If desired, the slit line could extend across the thin seal in a desired, could be made to extend immediately adjacent to or communicating with opening 214. As will be described more fully herein, 5 opening 214 has a pointed or acute angle end 214a and the slit line comprising the tear-start feature 210 is generally aligned with the direction of the pointed end 214a of opening 214. These features combined to form a 10 convenient directional assist to a consumer during a tear-open operation, ensuring that the tear will continue to a weakening line along with the shroud is severed from the remainder of the flexible package. As will be seen herein, the line of weakness is preferably formed with a 15 laser cutting/scoring operation which ensures a smooth, continuous severing of the shroud from the flexible package.

Preferably, slider 30 is located at a fully closed position along the fastener tracks and is surrounded by opening 214 at the closed position. In 20 order to gain access to the package contents, a user grasps the upper edge of shroud 204 causing an initially tearing at tear-start feature 210. Tearing continues through the shroud material so as to enter opening 214, emerging at the pointed or acute angle end 214a through a 25 line of weakness 208 which, as mentioned above, is preferably formed in a laser cutting/scoring operation. Optionally, as mentioned, a diagonal line may extend between the tear-start feature 210 and opening 214. It is generally preferred that such optional line be aligned 30 with the direction of the slit line 210 and the pointed end 214a. With continued tearing across line of weakness 208 separation of the shroud is continued the width of package 200, and the shroud 204 is removed, leaving a package substantially similar to the packages described 35 above in FIGS. 1-14.

Referring to FIG. 25, shroud 204 includes an upper fin seal 220 and a side fin seal portion 222. Preferably, the upper fin seal 220 inside fin seal 222

are formed in separate sealing operations and are made to slightly overlap one another for package integrity and sealing of the package interior. The bottom of side fin seal 222 is terminated at or slightly above end stop 68.

5 It is most preferred that side fin seal 222 be terminated slightly above end stop 68 to avoid interfering with the controlled formation of the end stop which, as pointed out above, has a shape and position providing novel advantages. Tear-start feature 210 in the preferred embodiment shown in FIG. 25 is formed at the lower end of side fin seal 222. If desired, tear-start feature 210 could be formed in a gap between end stop 68 and a side fin seal shortened with respect to the side fin seal illustrated in FIG. 25.

15 Referring now to FIG. 19, flexible package 240  
is substantially identical to flexible package 200,  
except for the introduction of a line of weakness 212  
extending between the tear-start feature 210 and the  
opening 214. The arrangement of FIG. 19 is preferably  
20 employed where the material chosen for the flexible  
package or at least the shroud portion thereof is easily  
stretched rather than torn cleanly when subjected to a  
tearing force. Addition of the weakening line adjoining  
the tear-start feature and the opening helps to improve  
25 the directionality of the tearing force applied by a  
consumer. Preferably, the direction of tearing force is  
generally aligned with the direction of the pointed end  
214a of opening 214.

Referring now to FIG. 20, a cross section of  
30 flexible package 200 is shown. Preferably, shroud 204 is  
formed as a continuous integral extension of panels 12,  
14, the upper free edges of which are joined together to  
form upper fin seal 220.

Referring to FIG. 21, exemplary tooling to form the package 200 are shown. For example, a pair of upper seal bars 250 form upper fin seal 220 while a pair of intermediate seal bars 252 join panels 12, 14 to fastener flanges 72, 74. Lower seal bars 254 form the peel seal

36 and weld band 78 (FIG. 20). The bottom of package 200, as is preferred with the other flexible packages shown herein, is formed by a dead fold 258.

Referring now to FIG. 22, a flexible package 5 260 is substantially identical to flexible package 200 of FIG. 18, except that the teardrop-shaped opening 214 is modified to have a generally V-shaped end opposite the pointed end 214a. To ensure that tearing enters into hole 214 as desired, it is generally preferred that 10 weakening line 212 bridge the distance between tear-start feature 210 and the adjacent end of hole 214.

FIG. 23 shows a flexible package 270 similar to that of flexible package 200, except that a large or tapered side seals are provided at each side of the 15 package. Peg holes 132, 140 are formed in the tapered side seal portions and if desired an optionally central peg hole 234 can be formed in upper fin seal portion 220. As with the other embodiments shown herein, it is generally preferred that the enlarged or tapered side 20 seal portions stop short of the line of weakness 208.

FIG. 24 is a cross-sectional view of an optional flexible package 280 substantially identical to flexible package 200, described above, except that a shroud member 282 is separately formed from panels 12, 14 25 and is joined to the upper ends of the panels by conventional welding or other joining techniques. Most preferably, shroud 282 is joined to the upper ends of panels 12, 14 at the point of sealing with flanges 72, 74. The weakening line for removal of the shroud of 282 30 can be formed either above or below the point of sealing with the remainder of the flexible package.

FIG. 26 shows an enlarged portion of flexible package 200, to more clearly illustrate the features of opening 214 in cooperation of the opening or hole 214 35 with the other features of the flexible package. As mentioned above, opening 214 has a pointed end 214a arranged so as to extend generally toward a central portion of the package. As shown, end 214a forms an

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acute angle of approximately 45°. If desired, the acute angle can be extended up to 70°. If desired, the pointed end 214a can form a sharp corner, but it is generally preferred that a rounded corner be employed, as 5 illustrated. It has been found important for certain types of flexible package materials at the end 214a be kept free of minute notches or tears. For reasons of economy, it is generally preferred that opening 214 be used by a die cutting operation and a rounded corner 214a 10 has been found to wear in such a manner over its production life so as to avoid tearing or minute notching which could result in misdirection of the tear force applied by a consumer attempting to gain access to the interior of the flexible package.

15 The acute angle feature of end 214a has been found helpful in contributing to the directionality of applied tearing force.

FIG. 27 shows flexible package 200 with the shroud member partially torn away. Tearing of the shroud 20 continues along line 208.

As indicated in the figures, it is generally preferred that the opening 214 have a lower portion extending below line of weakness 208, so as to further ensure that the tearing force will be applied to 25 weakening line 208.

Referring to FIG. 26 for example, the right half of opening 214, generally comprises a semicircle. The present invention also contemplates an arrangement where the left half of the opening also comprises a 30 semicircle. If necessary, the size of the resulting circular opening is increased to provide a space around slider 30 to avoid interference with the slide during opening.

The drawings and the foregoing descriptions are 35 not intended to represent the only forms of the invention in regard to the details of its construction and manner of operation. Changes in form and in the proportion of parts, as well as the substitution of equivalents, are

contemplated as circumstances may suggest or render  
expedient, and although specific terms have been  
employed, they are intended in a generic and descriptive  
sense only and not for the purposes of limitation, the  
5 scope of the invention being delineated by the following  
claims.

PROCESSED "EXCEDED"